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**PRESIDENCY UNIVERSITY
BENGALURU**

**SCHOOL OF ENGINEERING
MID TERM EXAMINATION - OCT 2023**

Semester : Semester III - 2022

Course Code : CIV2009

Course Name : Sem III - CIV2009 - Fluid Mechanics

Program : B. TECH

Date : 2-NOV-2023

Time : 9:30AM - 11:00AM

Max Marks : 50

Weightage : 25%

Instructions:

- (i) Read all questions carefully and answer accordingly.
- (ii) Question paper consists of 3 parts.
- (iii) Scientific and non-programmable calculator are permitted.
- (iv) Do not write any information on the question paper other than Roll Number.

PART A

ANSWER ALL THE FIVE QUESTIONS

5 X 2=10M

1. Fluid mechanics is the branch of physics concerned with the mechanics of fluids and the forces on them. List any two application of fluid mechanics in the field of Mechanical Engineering.
(CO1) [Knowledge]
2. By definition, a fluid is any material that is unable to withstand a static shear stress. List any two effects of shear stress on solids and fluids
(CO1) [Knowledge]
3. Define density and specific gravity of a fluid and also mention its units.
(CO1) [Knowledge]
4. Differentiate Uniform flow and Non-uniform flow.
(CO2) [Knowledge]
5. Define capillary effect and also give the equation to find magnitude of the capillary rise in a circular tube
(CO1) [Knowledge]

PART B

ANSWER ALL THE FOUR QUESTIONS

4 X 5 = 20M

6. Fluid moving relative to a body exerts a drag force on the body, partly because of friction caused by viscosity. State Newton's law of viscosity and with the help of neat sketch show the variation of fluid velocity with respect to depth as per Newton's law of viscosity.
(CO1) [Comprehension]

7. Hydraulic lift for automobiles is an example of a force multiplied by hydraulic press, based on Pascal's principle. With the help of neat diagram explain Pascal's principle
(CO1) [Comprehension]
8. Water is flowing through a pipe of 5 cm diameter under a pressure of 29.43 Newton/square centimeter and with mean velocity of 2.0 m/s. Find the total head or total energy per unit weight of the water at a cross section, which is 5 m above the datum line.
(CO2) [Comprehension]
9. A 0.8- mm -diameter glass tube is inserted into kerosene at 20 degree celsius as shown in figure. The contact angle of kerosene with a glass surface is 26° . Determine the capillary rise of kerosene in the tube. Take surface tension of Kerosene at 20 degree celsius is 0.028 N/m and specific gravity of kerosene = 0.820.
(CO1) [Comprehension]

PART C

ANSWER ALL THE TWO QUESTIONS

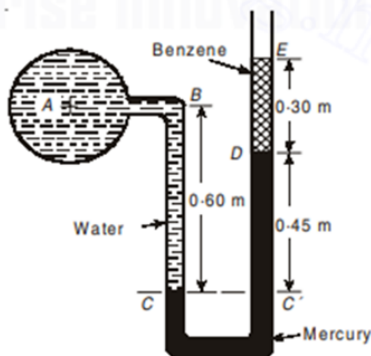
2 X 10 = 20M

10. An oil film of thickness 1.5 mm is used for lubrication between a square plate of size 0.9 m X 0.9 m and an inclined plane having an angle of inclination 20 degrees. The weight of the square is 392.4 N and it slides down the plane with a uniform velocity of 0.2 m/s. Find the absolute viscosity of the oil.

$$\frac{dC_1}{dP_{G1}} = 0.2 P_{G1} + 60 \text{ Rs./MWh}$$

(CO1) [Application]

11. The left leg of a U-tube mercury manometer is connected to a pipe-line conveying water, the level of mercury in the leg being 0.6 m below the center of pipe-line, and the right leg is open to atmosphere. The level of mercury in the right leg is 0.45 m above that in the left leg and the space above mercury in the right leg contains Benzene (relative density 0.88) to a height of 0.3 m as shown in figure. Find the pressure in the pipe.



(CO2) [Application]